CLAIMS

1. A method for segmenting a digital frame structure, the method comprising:

defining a hierarchical order in the overhead section of digital frame structure communications; and

processing communications in response to the hierarchical order of overhead section bytes.

2. The method of claim 1 wherein processing communications in response to the hierarchical order of overhead section bytes includes processes selected from the group including synchronization, scrambling, forward error correction, and node segmented channel communication.

3. The method of claim 2 wherein defining a hierarchical order in the overhead section of digital frame structure communications includes defining a frame overhead section in response to characteristics selected from the group including the quantity of overhead bytes, the location of overhead bytes, and the value of overhead bytes.

4. The method of claim 2 wherein defining a hierarchical order in the overhead section of digital frame structure communications includes defining a frame overhead section with a plurality of byte locations; and

the method further comprising:

selecting overhead byte locations from the plurality of byte locations; and

wherein processing communications in response to the hierarchical order of overhead section bytes in a hierarchical order includes processing in response to the selected overhead byte locations.

5. The method of claim 2 wherein defining a hierarchical order in the overhead section of digital frame structure communications includes defining an overhead section with a plurality of overhead byte quantities; and

the method further comprising:

selecting a quantity of overhead bytes from the plurality of overhead byte quantities; and

wherein processing communications in response to the hierarchical order of overhead section bytes includes processing in response the selected quantity of overhead bytes.

6. The method of claim 2 wherein defining a hierarchical order in the overhead section of digital frame structure communications includes defining an overhead section with a plurality of overhead byte values; and

the method further comprising:

selecting overhead byte values from the plurality of overhead byte values; and

wherein processing communications in response to the overhead section bytes in a hierarchical order includes processing in response the selected overhead byte values.

7. The method of claim 2 wherein defining a hierarchical order in the overhead section of digital frame structure communications includes defining an overhead section with a first configuration of overhead bytes and a second configuration of overhead bytes; and

wherein processing communications in response to the hierarchical order of overhead section bytes includes processing communications in a first process in response to the first configuration of overhead bytes and processing communications in a second process in response to the second configuration of overhead bytes.

8. The method of claim 7 wherein defining a hierarchical order in the overhead section of digital frame structure communications includes defining an overhead section with a plurality of overhead byte configurations; and

wherein processing communications in response to the hierarchical order of overhead section bytes includes processing communications in a plurality of processes in response to the plurality of overhead byte configurations.

9. The method of claim 4 wherein defining a hierarchical order in an overhead section with a plurality of byte locations includes

defining a hierarchical order in response to the configuration of overhead byte locations;

wherein selecting overhead byte locations from the plurality of byte locations includes selecting a first configuration; and

wherein processing communications in response to the hierarchical order of overhead section bytes includes selecting a first process in response to the first configuration.

10. The method of claim 9 wherein defining a hierarchical order in response to the configuration of overhead byte locations includes defining an overhead section with a plurality of byte location configurations;

wherein selecting overhead byte locations from the plurality of byte locations includes selecting a plurality of byte location configurations; and

wherein processing communications in response to the hierarchical order of overhead section bytes includes selecting a plurality of processes in response to the plurality of configurations.

11. The method of claim 10 wherein defining a hierarchical order in response to the configuration of overhead byte locations includes defining an overhead section with a first byte location configuration and a second byte location configuration;

wherein selecting overhead byte locations from the plurality of byte locations includes selecting a first and a second configuration; and

wherein processing communications in response to the hierarchical order of overhead section bytes includes selecting a first process in response to the first configuration and a second process in response to the second configuration.

12. The method of claim 5 wherein defining a hierarchical order in an overhead section with a plurality of overhead byte quantities includes defining a hierarchical order in response to configurations of overhead byte quantities;

wherein selecting the overhead byte quantities from the plurality of byte quantities includes selecting a first configuration; and

wherein processing communications in response to the hierarchical order of overhead section bytes includes selecting a first process in response to the first configuration.

13. The method of claim 12 wherein defining a hierarchical order includes defining an overhead section with a plurality of configurations of overhead byte quantities;

wherein selecting the quantity of overhead bytes from the plurality of byte quantities includes selecting a plurality of configurations; and

wherein processing communications in response to the hierarchical order of overhead section bytes includes selecting a plurality of processes in response to the plurality of configurations.

14. The method of claim 13 wherein defining a hierarchical order in response to configuration of overhead byte quantities includes defining an overhead section with a first configuration and a second configuration;

wherein selecting the quantity of overhead bytes from the plurality of byte quantities includes selecting a first and a second configuration; and

wherein processing communications in response to the hierarchical order of overhead section bytes includes selecting a first process in response to the first configuration and a second process in response to a second configuration.

15. The method of claim 6 wherein defining a hierarchical order in an overhead section with a plurality of byte values includes defining a hierarchical order in response to the configuration of overhead byte values;

wherein selecting overhead byte values from the plurality of byte values includes selecting a first configuration; and

wherein processing communications in response to the hierarchical order of overhead section bytes includes selecting a first process in response to the first configuration.

16. The method of claim 15 wherein defining a hierarchical order in response to the configuration of overhead byte values includes defining an overhead section with a plurality of byte value configurations;

wherein selecting overhead byte values from the plurality of byte values includes selecting a plurality of byte value configurations; and

wherein processing communications in response to the hierarchical order of overhead section bytes includes selecting a plurality of processes in response to the plurality of configurations.

17. The method of claim 16 wherein defining a hierarchical order in response to the configuration of overhead byte values includes defining an overhead section with a first configuration and a second configuration;

wherein selecting overhead byte values from the plurality of byte values includes selecting a first and a second configuration; and

wherein processing communications in response to the hierarchical order of overhead section bytes includes selecting a first process in response to the first configuration and a second process in response to the second configuration.

18. The method of claim 1 wherein defining a hierarchical order in the overhead section of digital frame structure communications includes selecting a predetermined location in a frame overhead section; and

wherein processing communications in response the hierarchical order of overhead section bytes includes forward error correcting the overhead bytes in the selected location.

19. The method of claim 1 wherein defining a hierarchical order in the overhead section of digital frame structure communications includes selecting a predetermined location in a frame overhead section; and

wherein processing communications in response the hierarchical order of overhead section bytes includes scrambling the overhead bytes in the selected location.

20. The method of claim 1 wherein defining a hierarchical order in the overhead section of digital frame structure communications includes selecting a first location and a second location in a frame overhead section; and

wherein processing communications in response the hierarchical order of overhead section bytes includes forward error correcting overhead bytes in the first location and not forward error correcting overhead bytes in the second location.

21. The method of claim 20 further comprising:

receiving the frame with a first error correction value;

extracting the overhead bytes in the second location;

substituting overhead bytes in the second location; and

transmitting the frame with the first error correction value.

22. The method of claim 1 wherein defining a hierarchical order in the overhead section of digital frame structure communications

includes selecting a first location and a second location in a frame overhead section; and

wherein processing communications in response the hierarchical order of overhead section bytes includes scrambling overhead bytes in the first location and not scrambling overhead bytes in the second location.

23. The method of claim 22 further comprising:

receiving the frame; and

reading the overhead bytes in the second location.

24. The method of claim 23 further comprising:

replacing the overhead bytes in the second location; and

transmitting the frame with the scrambled overhead bytes in the first location.

25. The method of claim 1 wherein defining a hierarchical order in the overhead section of digital frame structure communications includes selecting a first location and a second location in a frame overhead section; and

wherein processing communications in response the hierarchical order of overhead section bytes includes processing the overhead bytes of the first location at a first node and processing the overhead bytes of the second location at a second node.

26. The method of claim 25 further comprising:

receiving the frame at the first node; and

reading the overhead bytes in the first location.

27. The method of claim 26 further comprising:

transmitting the frame with the overhead bytes in the first and second locations from the first node;

receiving the frame at a second node; and

extracting the overhead bytes in the second location.

28. An integrated circuit (IC) relay system for segmenting a digital frame structure, the system comprising:

at least a first relay node including:

a frame receiver including an overhead receiver to receive the overhead section of a frame, a payload receiver to receive the payload section of the frame, and a decoder to provide a forward error corrected (FEC) frame;

wherein the overhead receiver includes an input to select a hierarchical order in the overhead section of received digital frame structure communications; and

wherein the frame receiver processes communications in response the selected hierarchy.

29. The system of claim 28 wherein the frame receiver processes communications selected from the group including synchronization, scrambling, forward error correction, and node segmented channel communication.

30. The system of claim 29 wherein the overhead receiver selects a hierarchy in response to overhead section byte configurations selected from the group including the quantity of overhead bytes, the location of overhead bytes, and the value of overhead bytes.

31. The system of claim 29 wherein the overhead receiver selects a hierarchy in response to accepting commands to select overhead byte locations from a plurality of byte locations; and

wherein the frame receiver processes communications in response to the selected overhead byte locations.

32. The system of claim 29 wherein the overhead receiver selects a hierarchy in response to accepting commands to select a quantity of overhead bytes from a plurality of overhead byte quantities; and

wherein the frame receiver processing communications in response to the selected overhead byte quantity.

33. The system of claim 29 wherein the overhead receiver selects a hierarchy in response to selecting overhead byte values from a plurality of overhead byte values; and

wherein the frame receiver processes communications in response to the selected overhead byte values.

34. The system of claim 29 wherein the overhead receiver selects a hierarchy in response to selecting a first configuration of overhead bytes and a second configuration of overhead bytes; and

wherein the frame receiver processes communications in a first process in response to the first configuration, and in a second process in response to the second configuration.

35. The system of claim 34 wherein the overhead receiver selects a hierarchy with a plurality of overhead byte configurations; and

wherein the frame receiver processing communications in a plurality of processes responsive to the plurality of configurations.

36. The system of claim 31 wherein the overhead receiver selects a hierarchy in response to selecting configurations from a plurality of byte location configurations; and

wherein the frame receiver processes communications in a plurality of processes responsive to the selected configurations.

37. The system of claim 32 wherein the overhead receiver select a hierarchy in response to selecting configurations from a plurality of overhead byte quantities; and

wherein the frame receiver processes communications in a plurality of processes in response to the selected configurations.

38. The system of claim 33 wherein the overhead receiver selects a hierarchy in response to selecting configurations from a plurality of overhead byte values; and

wherein the frame receiver processes communications in a plurality of processes in response to the selected configurations.

39. The system of claim 28 wherein the overhead receiver selects a hierarchy in response to selecting a location in a frame overhead section; and

wherein the frame receiver performs forward error correction of the overhead bytes in the selected location.

40. The system of claim 28 wherein the overhead receiver selects a hierarchy in response to selecting a location in a frame overhead section; and

wherein the frame receiver descrambles the overhead bytes in the selected location.

41. The system of claim 28 wherein the overhead receiver accepts commands to select a hierarchy in response to first and second location configurations in the frame overhead section; and

wherein the frame receiver forward error corrects overhead bytes in the first location, but not in the second location.

42. The system of claim 28 further comprising:

at least a second relay node including:

a frame receiver including an overhead receiver to receive the overhead section of a frame, a payload receiver to receive the payload section of the frame, and a decoder to provide a forward error corrected (FEC) frame;

wherein the overhead receiver includes an input to select a hierarchical order in the overhead section of received digital frame structure communications; and

wherein the first and second relay nodes accept communications including a frame overhead section defining a hierarchy with a first byte location and a second byte location;

wherein the first node overhead receiver includes an input to select the first byte location;

wherein the first node frame receiver performs a first communication process in response to the bytes in the first location;

wherein the second node overhead receiver includes an input to select the second byte location; and

wherein the second node frame receiver performs a second communication process in response to the bytes in the second location.

43. The system of claim 42 further comprising:

a first relay node transmitter including:

a frame generator including an overhead generator to generate the overhead section of a frame, a payload generator to generate the payload section of the frame, and an encoder to provide forward error correction for the frame; and

wherein the overhead generator includes an input to select the hierarchical order in the overhead section.

44. The system of claim 43 wherein the first node frame receiver receives a frame with a first forward error correction;

wherein the first node frame receiver substitutes overhead bytes in the second location;

wherein the first node frame generator transmits a frame with the substituted overhead bytes to the second node receiver; and

wherein the second node frame receiver receives the frame with the first forward error correction.

45. The system of claim 43 in which the first node transmitter has an output connected to the input of the second node receiver;

wherein the first node frame receiver receives a frame with bytes scrambled in the first location and unscrambled bytes in the second location;

wherein the first node frame receiver reads the overhead bytes in the second location;

wherein the first node frame generator transmits the frame with the scrambled bytes in the first location to the second node receiver; and

wherein the second node frame receiver receives the frame with the scrambled bytes in the first location.

46. The system of claim 45 wherein the first node frame receiver replaces the overhead bytes in the second location; and

wherein the first node frame generator transmits the frame with the scrambled overhead bytes in the first location.

5